

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re the Application of:

Marlow, et al.

Serial No. 09/773,580

Filed: February 2, 2001

**PAPER ELIMINATION IN THE PRODUCTION OF BATTERY PLATES**

Our File: T8465812US1

Examiner: Boyer Dolinger Ashley

October 16, 2003

Sir:

**PRELIMINARY AMENDMENT**

This is a preliminary amendment on the above-identified application.

**In the Specification**

Page 1, line 2, insert before "Field of the Invention", the sentence:

**--This application is a Divisional of Application Serial No. 09/773,580 filed February 2, 2001, now pending.--**

A substitute page having the above cross reference to related applications is enclosed.

**In the Claims**

Please delete claims 1 – 8 from the above-identified application. Claims 9 – 21 remain for the filing of a divisional application.

Please amend claims 9, 15, 18 – 21 as follows:

Claim 9 (Amended)

An apparatus for cutting pasted expanded, punched or cast continuous lead or lead alloy mesh strip into paperless battery plates comprising a pair of opposed rolls having cutting blades on at least one roll for cutting the pasted lead or lead alloy mesh strip into equal lengths, means

# **PAPER ELIMINATION IN THE PRODUCTION OF BATTERY PLATES**

## **BACKGROUND OF THE INVENTION**

This application is a Divisional of Application Serial No. 09/773,580 filed February 2, 2001, now pending.

### 5 (i) **Field of the Invention**

This invention relates to the continuous production of positive and negative electrode plates for use in lead-acid batteries, and more particularly, is directed to elimination of paper as barriers on both sides of pasted continuously expanded, punched or cast metal mesh strip during production of battery plates. Heretofore, such paper has been a standard requirement  
10 in the continuous production of battery plates in order to avoid the sticking of paste to the dies in the apparatus used to cut pasted metal mesh strip into battery plates.

### (ii) **Description of the Related Art**

Conventional book mold cast plates for use in lead-acid batteries do not need a paper barrier because the individual plates do not require cutting after pasting. However, the  
15 continuous production of battery plates by the cutting of individual plates from rotary or reciprocated expanded mesh or cast mesh strip saturated with a paste necessitates the presence of a paper barrier on each side of the mesh strip to cover the paste.

U.S. Pat. No. 4,315,356 granted February 16, 1982 to Cominco Ltd. discloses the production of expanded metal mesh from a coil of continuously cast metal alloys for use as  
20 battery plates. A slitting and expanding technique was developed for the continuous production of the expanded metal mesh from lead alloy strip cast by a drum caster. The expanded metal mesh was coated with a paste and the pasted mesh divided into discrete plates by a plate-cutter apparatus. Related technology is typified in U.S. Patents No. 4,315,356 issued February 16, 1982, No. 4,291,443 issued September 29, 1981, No. 4,297,866 issued  
25 November 3, 1981, No. 5,462,109 issued October 31, 1995, and No. 5,896,635 issued April 27, 1999 to Cominco Ltd., and in U.S. Patent No. 5,669,754 issued September 23, 1997 to Advanced Dynamics Corporation Ltd., all incorporated herein by reference.

The plate-cutter apparatus, also known as a divider or die-cutter, is an integral part of the continuous lead-acid battery manufacturing process and is well known in the art. The plate

### **Versions with Markings to Show Changes Made**

9. An apparatus for [continuously] cutting pasted[, ] expanded, punched or cast continuous lead or lead alloy mesh strip into paperless battery plates comprising a pair of opposed rolls having cutting blades on at least one roll for cutting the pasted lead or lead alloy mesh strip into equal lengths, means for journalling said rolls in operative abutment with each other in a supporting frame, conveying means for continuously passing the pasted lead or lead alloy mesh strip between the opposed rolls, and heating means for heating the cutting blades and opposed rolls to a temperature above about 150°C.
15. An apparatus for [a] cutting pasted expanded continuous lead or lead alloy mesh strip into paperless battery plates for lead-acid batteries [according to the method of claim 7] comprising a pair of opposed rolls having cutting blades on at least one roll for cutting the pasted lead or lead alloy mesh strip into equal lengths, means for journalling said rolls in operative abutment with each other in a supporting frame, conveying means for continuously passing the pasted lead or lead alloy mesh strip between the opposed rolls, and [heating means for heating] electric cartridge heaters mounted axially on each roll for uniformly heating the cutting blades [dies] and opposed rolls to a temperature above about 150°C.
18. A paperless battery plate for use in lead-acid batteries produced by the method of claim 1.
19. A paperless battery plate for use in lead-acid batteries produced by the method of claim 8.
20. A lead-acid battery having a plurality of paperless battery plates produced by the method of claim 1.
21. A lead-acid battery having a plurality of paperless battery plates produced by the method of claim 8.
22. An apparatus as claimed in claim 15, in which said pair of opposed rolls comprise a die roll having the cutting blades thereon and an opposed anvil roll, and in which the electric cartridge heaters heat the die roll, cutting blades and the anvil roll to a temperature in the range of about 160 to 300°C.
23. An apparatus as claimed in claim 22, in which the electric cartridge heaters heat the die roll, cutting blades and the anvil roll to a temperature in the range of about 180 to 210°C.